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STUDIES

IN AFRICAN LAND USAGE

IN

NORTHERN RHODESIA

BY

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PREFACE

The four papers reproduced here deal with a method of estimating land carrying capacities for human populations under African conditions and systems of land usage, and the application of this method to the study of practical problems. The method itself is based on Trapnell's work on the soils and agricultural systems of the Territory, and details of the method as applied in practice have largely been evolved in collaboration between him and the author, with material assistance from other members of the Agricultural Department.

The first paper gives an outline of the technique used in carrying out detailed studies of land problems in the Eastern and Western Provinces of Northern Rhodesia. The basic conceptions of land deterioration and population carrying capacity, the relation of Native land usage to the vegetation-soil unit and the factors involved in the estimation of critical densities, which are discussed in this account, have already been referred to in Trapnell's *Ecological Report on North-Eastern Rhodesia* (paras. 37–41, 79 and 302–26). The main emphasis in Trapnell's account, however, is on the land deterioration aspect, whereas in the present essay the subject is given fuller treatment from the population standpoint and in the light of recent work on the redistribution of populations.

The second paper consists of a report, submitted to Government in 1940, on a reconnaisance survey of conditions in the area of the Lamba Chief Mushiri. This survey was the first attempt to apply the conception of land carrying capacity and the method of estimation to the study of a specific practical problem. Shortly afterwards the method was applied, on a vastly greater and more detailed scale, to the resettlement of congested populations in the Fort Jameson and Petauke Districts of the Eastern Province. In 1943 further study was given to the whole proplem of the concentration of populations, including that of Mushiri's area, about the southern and eastern rim of the Copperbelt. In the interval a Government Land Commission had visited the area. This Commission reported that the predictions made in the original report were being rapidly fulfilled and recommended the immediate grant of additional land under controlled settlement. Resettlement of populations from Mushiri and other overcrowded chieftaincies was started in 1943 and all of the recommendations contained in the original report have now been carried out or are in process of completion (see Annual Reports of the Agricultural Department, 1943–6). It will be noted that the Vegetation-Soil units have been revised and that other factors in the method of estimation have been somewhat modified, as a result of greater knowledge, since the original pioneer survey was made.

The third paper is a report, presented to Government in October 1944, on the vexed question of the adequacy or otherwise of the native reserves

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in the Mkushi District and the additions which have from time to time been made to them. This study deals with two somewhat more complex systems, both in a state of change, in which *chitemene* and hoe cultivation methods are combined. The report was followed, after further study, by an annexure (not reproduced here as it contains little of general interest) giving details of the proposed land additions and population transfers, and precise suggestions for measures to improve land usage which might be carried out by Native Authorities. Most of these suggestions have been adopted by the Native Authorities concerned.

It will be realized that both the Mushiri and Mkushi reports are strictly reconnaissance surveys intended to define the nature and scope of specific problems, to indicate what immediate measures may be necessary, and to pave the way for further more detailed study and survey on the lines indicated in the first paper.

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The fourth paper gives a brief and general account of the resettlement work which has been carried out, or is in process of completion, in Northern Rhodesia. It, like the first paper, was written in reply to numerous enquiries as to the technique, methods and objects of resettlement. None of the papers was intended for publication at the time it was written, but it is thought that their presentation may be of some value as a contribution to the study of the relationship between the African and his land.

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The question of land usage and its relation to the available supply of land is, of course, only one aspect of the general problem of African development. The life of the African is so intimately bound up with his land that one may almost say that there is no problem concerning him which is purely agricultural; just as there are few problems which are purely administrative, political, sociological, medical or veterinary. All of these aspects are often intimately, sometimes inextricably, bound together as integral parts of the one common problem.

In recent surveys, of which it is hoped to publish an example shortly, sociologists of the Rhodes-Livingstone Institute have co-operated closely with officers of the Agricultural Department in the study of specific aspects of a common problem. Extension of this co-operative method of approach offers the best hope for the solution of many of the problems of African land usage.

But such studies, to be of full practical value, must take into account the effects of changing conditions. The industrial and economic changes which are to be expected within the next decade will profoundly affect the whole structure of African life and will, to a very large extent, determine the pattern and speed of rural development.

Mazabuka,
6 November 1947.

W.A.

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Native Reserves and Native occupied Crown Land. 1928-41.

Resettlement areas and and additions. 1941-48.

SKETCH MAP OF PART OF NORTHERN RHODESIA TO SHOW THE AREAS OF THE WESTERN PROVINCE, MKUSHI DISTRICT AND EASTERN PROVINCE, REFERRED TO IN THE TEXT.

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low productivity and little power of recovery. Next, the weaker soils will be abandoned: such data as we have suggests that this stage is reached when grain yields fall below 200 lb. per acre in the normal season. The former cultivators of the abandoned land may then offer work in exchange for the food surplus still enjoyed by the holders of the stronger soils, or they may be entitled to a share of the surplus by virtue of kinship obligations. In this way a period of increasing pressure and accelerated erosion on the stronger and more fertile soils is brought about. These stages will commonly be accompanied by migration of able-bodied men to the centres of employment and the stage finally be reached when the area is dependent to a large extent on food purchased from outside sources.

In 1941 a study was made of a highly congested area in Fort Jameson District; the area of Mpezeni, Paramount Chief of the Ngoni. The chieftaincy was found to be 54,000 acres in extent and, after detailed survey, the carrying capacity for traditional Ngoni agriculture was estimated to be about 1,300 to 1,400 persons. A total of 7,700 people, between five and six times the carrying capacity, were supposedly living within the chieftaincy. In short, an area which, because of the high proportion of mountain country, had a critical density of only about 16 persons per square mile did in fact appear to be carrying over 90 to the square mile.

The main reasons for the continued survival of this population were found to be as follows:

(a) The time during which these conditions had existed (about 15 years) was not sufficient to show the full effects of this degree of land pressure.

(b) Great areas of hill country and dambos, which would not normally be cultivated, had been taken into cultivation. The almost incredible mountain cultivation on the Nyamfinzi range was, until recently, a startling spectacle. Use of dambo grassland for *fipoka* gardens had seriously reduced grazing and was a sore point with the cattle-loving Ngoni.

(c) Under extreme pressure the population had burst its bounds and an irresistible tide had inundated adjoining private land and unoccupied European farms. In addition, a missionary organization had permitted cultivation, on payment, on land owned by the mission. By these means the effective acreage had, in fact, been increased by almost 50 per cent.

(d) A very heavy burden had been thrown on the limited soils of high fertility and resistance to erosion, the only soils left in the original area still carrying moderately good crops. These soils, then in continuous cultivation, were feeding more than twice as many people as they would normally do.

(e) The Paramount Chief was importing from Nyasaland each year a considerable quantity of food for the use of his people.

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The people in the original area were short of food but by no means at starvation level. This was ascertained by taking seven sample villages at random within the congested area and weighing their entire food stocks during the first fortnight of February. From these samples the following data were obtained.

Grain Stocks of Seven Ngoni Villages
(February 1941)

Total population			Total grain stocks
Men	Women	Children	lb.
292	389	531	24,710

Making no allowance for a special reserve of seed against a possible need for replanting, or for loss in preparing flour and for other reasons, the grain stock represents not more than 20 days usage, and supplies would probably be exhausted by early March. There was much variation between villages; one exceptional village had enough grain for 46 days while in another the grain stocks represented only 4 days supply. It will be remembered, however, that in an African social system, kinship obligations tend to even out the distribution of food supplies.

In striking contrast to these samples, a village which had recently made an illicit move to unoccupied private land was found to have, at the end of February, grain stocks representing 81 days supply. The effects of falling yields first make themselves felt in the bad years and it should be noted that the sampling was done in a year following a good climatic season. It will also be noted that villages which would in all probability have reached the starvation level had already transferred themselves.

There is, then, a time lag between the beginning of over-crowded conditions and the point at which obvious symptoms of land degeneration and soil erosion appear. The length of this time lag clearly depends on a number of factors acting together; the type of land and the system used on it, the degree of congestion, the original population density and the rate of population increase, if any. A further variable time lag elapses before conditions of general food shortage are reached. Under some conditions the process of land degradation may result in food shortage within a very few years, while in other cases this result may not appear for twenty years or more.

Within ten years of the creation of reserves in the Mkushi District obvious land degradation and recurrent food shortages in some areas had reached such a stage as to attract the attention of District Officers, missionaries and other interested persons, and to create an insistent demand for additional land. The population densities in these areas were 18 to 25 persons per square mile. Other areas of the Territory, notably the reserves of the

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Other areas of the Territory, notably the reserves of the Northern and Eastern Provinces, provide similar examples for different systems and land categories. In the second Report of the Ecological Survey (North Eastern Rhodesia, paras. 316–20) Trapnell records a wide range of observations on areas where land degeneration and soil erosion had become marked, in relation to land categories, population densities and the time factor. These observations provide independent evidence of the relatively low carrying capacity of much of our land under the traditional systems, and they accord well with the estimates obtained by the methods outlined in this paper.

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PART IV

THE RESETTLEMENT OF NATIVE POPULATIONS IN NORTHERN RHODESIA

§ 1. *The Problem and its Origin*

IN Northern Rhodesia and doubtless over a much greater part of Africa before the coming of the Europeans, the population-land pattern was a changing, kaleidoscopic picture. If an area became overcrowded more land was available, or it could be taken from a neighbouring people. A rough balance between land and population was maintained by means of migration, inter-tribal wars, periodic famine and disease.

With the coming of the European the kaleidoscopic picture was arrested, producing what we may call the primary population-land pattern. This was later modified, by alienation and reservation of land and by the movement of peoples into Native reserves, to produce a secondary pattern. New economic factors have so far modified this secondary pattern only to a minor extent, but it may be expected that they will tend to do so increasingly in the future.

The secondary population-land pattern was brought about mainly by the movement of the African population into Native reserves. As a result of this movement large areas of Crown Land were left practically uninhabited, and a number of factors operating together brought about mal-distribution and congestion of populations within the reserves themselves.

So far the problem has been studied in detail only in the Fort Jameson and Petauke Districts of the Eastern Province, the Mkushi District of the Central Province and the Ndola District of the Western Province, and it is within these districts that resettlement work—other than the 'Chitemene Control' scheme—has been carried out. The four districts are contiguous and the total area within them to which this discussion refers is about 33,800 square miles (4,000 square miles more than the whole land area of Scotland but only about one-ninth of the area of Northern Rhodesia) with a total population, in round figures, of 290,000 (about one-sixth of the total population of the Territory).

The primary population-land pattern was such that the ten tribes living within this area had ample or much more than ample land, except to a minor extent in the Fort Jameson District where the incursion of the immigrant Ngoni in the later 19th century had created a potential congestion problem. Under former conditions this problem would doubtless have resolved itself as it arose by migration of the Chewa to north and west, under pressure from the Ngoni, but once the kaleidoscopic pattern was arrested no such

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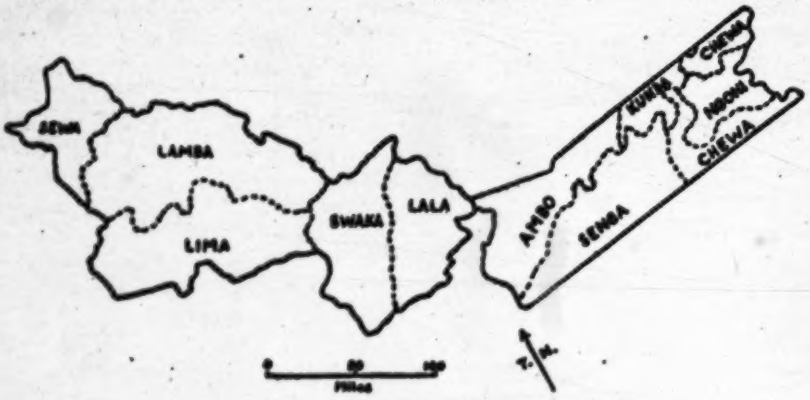

Fig 1.— THE ORIGINAL POPULATION-LAND PATTERN
Showing areas held by tribes.

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movement was possible. The lands of the Ngoni and Chewa were then reduced, by alienation to European settlers and by reservation, to an extent which the following figures illustrate:

Habitable Land held by Tribes (square miles)

	Chewa	*Ngoni* *
Before Ngoni invasion	3,580	–
After Ngoni invasion	2,280	1,300
After land alienation	1,124	878
After creation of reserves	889	675

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Throughout the Petauke and Mkushi Districts the amount of land taken up by European settlers was negligible, but the Senga, Ambo, Lala and Swaka peoples were moved into Reserves some of which proved totally inadequate for the land needs of their traditional agricultural systems.

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In the west (Ndola District) the congestion problem arose largely as a result of displacement of people from the area which is now the Copperbelt of Northern Rhodesia, a land loss which fell on the Lamba tribe. The land area of Mushiri's section of the Lamba, for example, which formerly included part of the Copperbelt, was reduced from 2,200 to 360 square miles. The Lamba were removed from the new mining areas and this movement accentuated by some migration of more distant peoples attracted by the mines, gave rise to a belt of relatively high population concentration about the southern and eastern margins of the Copperbelt.

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* With a mixture of Chewa and other tribes.

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In demarcating the Reserves three assumptions were made; that populations would prove sufficiently fluid to adapt themselves to the altered circumstances and to attain an equitable distribution in relation to the available land, that artificial water supplies would be provided on a scale sufficient to allow of such a distribution and that improvement in methods of agriculture would be sufficiently rapid to compensate for land loss and to provide for increasing populations. However reasonable these assumptions may have been at the time, none has been verified by events. The boundaries of tribes and chieftaincies remained static, there was little or no migration from over-populated to under-populated areas and in one instance congestion was aggravated by immigration from outside the Territory. The systems of land usage tended to degenerate rather than to improve, partly owing to increasing pressure on the land and partly because of migration of the men to the centres of employment. It was assumed too that adequate agricultural and water development services would be provided, and it proved beyond the resources of the country to provide such services in time to meet the need.

As a result of these factors, some of which could not have been foreseen owing to the lack of adequate data at the time, and some of which, like the economic depression and its effect on territorial finances, were unpredictable, extreme maldistribution arose in some parts of the Reserves. By 1941 more than half of the people within the Native Reserves of the four districts were living under conditions of more or less acute land shortage in relation to the land needs of their traditional sytems, and very considerable areas were in process of rapid degeneration.

There is now little point in discussing whether or not the application of measures for agricultural improvement could have solved the problems of over-concentration without transfer of populations. In all probability no measure which would have been practicable could have met the case. The agriculture of a people can be rapidly developed only if three factors are present together; the means, the incentive and the will. Throughout the area we are discussing these factors were and for that matter still are, to a large extent absent. Except for local concentrations of cattle among the Ngoni, Chewa and eastern Senga, stock are lacking or negligible in numbers. The only implements are the hoe and the axe. A high proportion of the able bodied men are away at work, and the main source of income is from local employment by Europeans or the fraction of the wages of migrant labour which returns to the villages. With one or two local exceptions there are no cash crops sufficiently remunerative to compete with the attraction of the labour centres or to act as an incentive and provide the means for agricultural improvement. Nor was there any will to adopt new, incomprehensible and laborious methods while great areas of land, formerly in the possession of the people, remained empty and unused. This psychological factor alone would have defeated, and where it was attempted did defeat, all efforts at agricultural improvement. In addition, throughout most of the cattle areas of the Eastern Province population concentrations had reached such a level that even the immediate general adoption of an advanced system

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of mixed farming would not have solved the problem without the transfer of a considerable proportion of the people.

§. 2. *Recommendations of the Land Commission*

In 1941 a large part of the land held by the North Charterland Exploration Company in the Fort Jameson and Petauke Districts was acquired by Government, and in 1942 a Land Commission was appointed which included in its terms of reference the making of 'full provision for the agricultural requirements of the Natives'. This Commission recommended that some 5,600 square miles of unalienated Crown Land in the Fort Jameson and Petauke Districts, about 2,000 square miles in the Mkushi District and 4,800 square miles in the Ndola District, should be constituted Native Trust Land and made available for Native occupation.

§ 3. *The Problem of Resettlement*

The problem then resolved itself into making the best possible use of the additional land, and using it in such a way as to restore the population-land balance where this could be done. It was not, of course, possible, even if it had been desirable, to recreate the primary population-land pattern, but the grant of additional land gave an opportunity of creating a planned tertiary pattern to replace the arbitrary secondary pattern.

Such planning requires a detailed knowledge of the land and of the agricultural systems employed on it. Fortunately the basic knowledge had already been provided by the Ecological Survey of the Territory. The vegetation-soil method, evolved by Trapnell, provided a rapid and reliable means of land classification and, again on the basis of the work of the survey, a method of estimating approximate land carrying capacities for traditional African systems of usage was devised. Description of the vegetation-soil method of land classification will be found in the two reports of the Ecological Survey and notes on the factors involved in the estimation of land carrying capacities are given in the second of these reports.*

A complete description of the method of estimating land carrying capacities, as employed in the resettlement work, and examples of its application are given in the other papers in this series.

It is necessary to understand clearly what is meant by the terms 'land carrying capacity' and 'population-land balance', as they are used here. There is a very definite limit to the number of people any land area will support in perpetuity, if the population obtains its food only from within that area. This limit is fixed by certain natural characteristics of soil and

* *The Soils, Vegetation and Agricultural Systems of North Western Rhodesia*, Lusaka: Government Printer, 15s. *The Soil, Vegetation and Agricultural Systems of North Eastern Rhodesia*, Lusaka: Government Printer, 5s.

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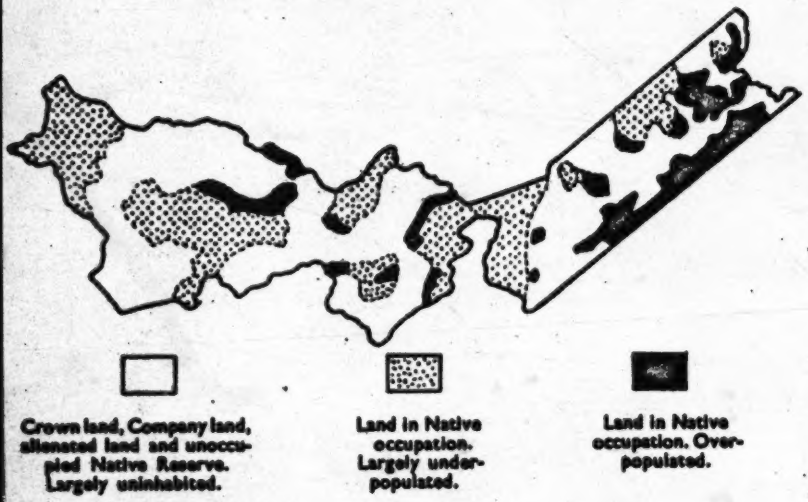
Crown land, Company land, alienated land and unoccupied Native Reserve. Largely uninhabited.
Land in Native occupation. Largely under-populated.
Land in Native occupation. Over-populated.

Fig 2.— THE SECONDARY POPULATION-LAND PATTERN.

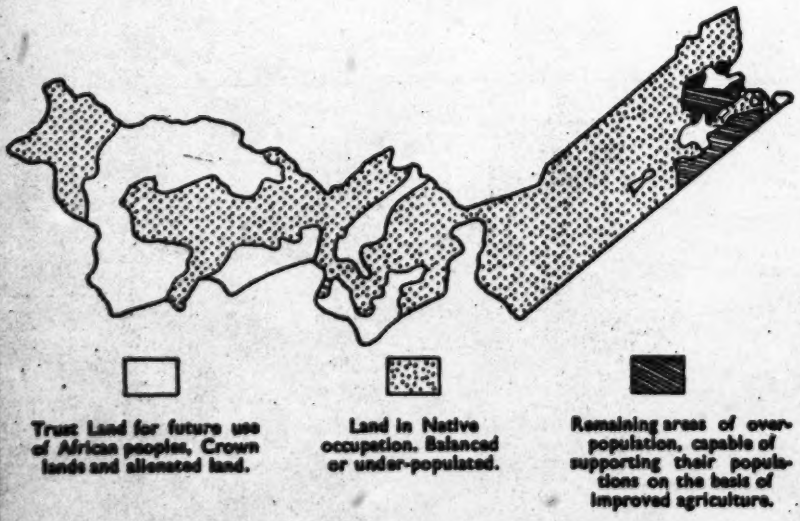
Trust Land for future use of African peoples, Crown lands and alienated land.
Land in Native occupation. Balanced or under-populated.
Remaining areas of over-population, capable of supporting their populations on the basis of improved agriculture.

Fig. 3.— THE POPULATION-LAND PATTERN AFTER RESETTLEMENT.

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climate and by the way in which the land is used. If the limit is exceeded *without a compensating change in the system of land usage* then a process of land degradation is set in operation and ultimately, unless food is obtained from outside the area, population must decline to the limit determined by natural conditions and the system of land use, or to a lower level. This limit, the maximum number of people that a given land area will maintain in perpetuity under a certain system of land usage, has been termed the 'carrying capacity' of the area *for that system*. It will be clear that the term can be used only in relation to a clearly defined system of land usage. Throughout these notes, when no statement to the contrary is made, the expression is used in relation to the traditional agricultural system of the tribes concerned. These systems, and the staple crops which go with them, vary greatly within this relatively small area of 33,800 square miles, and range from a primitive form of axe-agriculture among the Western Lala to comparatively advanced soil selection methods practised by the Eastern tribes. Descriptions of all of these systems will be found in the publications to which reference has already been made.

The term 'population-land balance' hardly requires definition. If the total population of an area is equal to or less than the land capacity for the system of agriculture practised, then a population-land balance exists within that area. When the total population is well below the land carrying capacity the areas may be described as under-populated.

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These concepts, and the methods of survey and of estimating the carrying capacities for the different land categories and agricultural systems, were applied to the problem of resettlement. Rapid reconnaissance surveys were made throughout the populated areas, with the objects of assessing approximately the land carrying capacity for each chief's area and estimating the number of people who would have to be moved to unoccupied land in order to re-establish a population-land balance on the basis of the traditional agricultural systems. The estimate indicated that a total of about 160,800 people would have to be moved, as shown in the Table below.

District	*Tribe*	*Number of people to be moved*
Fort Jameson	Chewa, Ngoni	98,300
Petauke	Senga	35,000
	Ambo	8,000
Mkushi	Lala	3,200
	Swaka	4,300
Ndola	Lamba	12,000

The estimates make no allowances for the readjustment of population distribution within the old Reserves. Some chieftaincies were in fact much under-populated and in some of the Reserves considerable areas remained almost or completely uninhabited because of water shortage, the occur-

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rence of sleeping sickness or for other reasons. It would have been possible by re-distribution of populations within the old Reserves, in conjunction with provision of water supplies and measures against 'fly', materially to reduce the number of people to be moved to unoccupied land. Such a course would have involved serious political repercussions and, in view of the amount of land available, it was never contemplated.

The next essential step was to survey the vacant land available for resettlement, to prepare vegetation-soil maps of the areas, and to estimate the carrying capacity of each area for the traditional agricultural system of the people who would occupy it. In the Eastern Province and the Ndola District surveys were made on the basis of parallel straight line traverses, using liquid prismatic compasses and cyclometer wheels. Traverse lines were usually one mile apart, but wider intervals up to three miles were used, in order to save time, if the country was relatively uniform or if no high degree of accuracy was required. In some instances, when very accurate maps were wanted, the traverse interval was reduced to one half or one quarter of a mile. Information on water supplies, the state of regeneration of land and timber, the former inhabitants and other relevant details, was collected in the course of these surveys. In the case of Mkushi District, where there was an abundance of available land in relation to the needs of the population, sample traverses only were used. The methods of survey and mapping are described in one of the other papers in this series.

When estimates had been made of the number of people to be moved from each of the over-crowded chieftaincies and the carrying capacity of the available land, divided into convenient areas, had been ascertained, the planning of population movements became, in theory, simple. In practice, of course, there were a good many difficulties.

Tribal boundaries and the original ownership of the land had to be taken into consideration, though these were not regarded as sacrosanct and, in fact, a large area formerly occupied by the Senga was used for the resettlement of a section of the Chewa. Other factors also limit movement. There is, obviously, a physical limit; fifty miles was regarded as the maximum practical move, but in extreme cases villages were moved as much as seventy miles. Traditional systems of land usuage are, generally, adaptations to particular sets of ecological conditions and people cannot be moved into an environment unsuited to their food crops and method of production. Cattle-owning people will not willingly move to tsetse country leaving their herds behind.

Water supplies proved to be a very great difficulty over large areas, especially in the Eastern Province. Natural supplies were not sufficient to allow of full utilization of the land on the basis of its carrying capacity, and in some cases practically no settlement was possible before artificial watering points had been provided. It appeared that, in the Eastern Province at least, permanent surface water had greatly diminished in the twelve to twenty years during which the land had lain unoccupied. The old sites of villages and their sources of water supply were noted in the course of the

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surveys. In an astonishing number of cases these sites were in completely waterless country and what were stated to have been permanent streams, pools and springs had dried up. The fierce late fires which swept through the empty country each year may have been a major cause of the dessication.

§ 4. *Roads and Watering Points*

After survey had been completed and before movement into an area started, roads (generally earth tracks twelve feet wide) were constructed. These were essential in order to facilitate movements of people and their food-stocks and goods, to enable subsequent supervision and to allow of the construction of watering-points. The preliminary surveys and the maps constructed from them were invaluable in planning the road systems in relation to topography and soils, so that they would be passable throughout the year.

Wherever necessary plans were prepared in advance, also on the basis of the preliminary surveys, to provide sufficient water for the number of people to be moved into each area, and the work of constructing water points was undertaken by the Water Development Department. Water was usually provided by means of dug wells (25 to 100 feet in depth), occasionally supplemented by bore-holes, but in some areas wells were unsuccessful and earth dams were constructed. In one locality, the Mushiri resettlement area of Ndola, a particularly favourable site was used to make a large central dam which was stocked with bream (*Tilapia spp.*) in the hope of producing a fish supply for the surrounding villages. A large scale water programme was undertaken, and is still in progress, in the Eastern Province and a minor programme of some thirty wells has been completed in Ndola District where natural supplies are very much better.

§ 5. *Game and Tsetse Control*

Another difficulty was the occurance of destructive game in unoccupied country. Villages commonly objected to movement on the grounds that elephant and wild pigs would destroy the crops, an objection which often contained a good deal of substance.

Reduction of destructive game was carried out, as far as ammunition supplies and trained African staff would allow, by the Department of Game and Tsetse Control.

In the northern part of Fort Jameson Districts, where a few cases of sleeping sickness appeared among villages moved into a 'fly' area, a campaign of game elimination was undertaken by the Department in conjunction with the clearing of 'hard pan' (pockets of *Albizzia Harveyi* on compacting pedocal soils, generally near watercourses). These measures appear to be giving very satisfactory and rapid results and the fly has been much reduced or eliminated in areas where it was formerly abundant.

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Other parts of the Eastern Province resettlement areas are also 'fly' country, but apparently free from sleeping sickness and it is only in the northern zone that intensive measures against tsetse have been carried out so far. The large available land area in Mkushi enabled the relatively small 'fly' areas to be avoided. This was fortunate as sleeping sickness is believed to be endemic in the western 'fly' areas of Mkushi.

The resettlement area of Ndola District was believed to contain sparse 'fly' in local pockets. Trials were made by the Agricultural and Veterinary Departments in co-operation by placing herds of cattle throughout the area and grazing them within a definite range about the kraals. Ten herds each of five beasts were used; the animals were numbered and blood slides were taken from each at frequent intervals. As a result of these trials it was found that almost the whole area was free of trypanosomyaisis and suitable for stock raising, and the small areas of 'fly' infestation were defined.

§ 6. *Method of Settlement*

Areas for resettlement were allocated to each tribe and chieftaincy in accordance with the general plan to restore the population-land balance as far as possible. Movement was, in theory at least, entirely voluntary but in many cases a good deal of persuasion was necessary to obtain the necessary number of villages. Most villages naturally preferred that their neighbour should move and that they should take over the vacated land rather than go to the trouble of moving. District Officers and Agricultural Officers held preliminary discussions with the people and the question of the villages to move into the resettlement areas was settled with the co-operation of the Native Authorities. Population counts of these villages were made, usually by District Officers.

Headmen and other representatives of the villagers who had finally elected to move then toured the area allocated to them and selected sites for the new villages. The headmen and the villagers almost invariably arranged this matter among themselves without any difficulty whatsoever. The selected sites were then marked on the Vegetation-Soil Map. Blocks of land having an estimated carrying capacity approximating to the total villages population, allowing for temporary absentees, were demarcated around the selected sites, using roads, streams, hills and cut or blazed lines as boundaries. Estimates of land carrying capacity were, of course, based on the traditional agriculture of the people concerned. This allocation of land areas for individual villages proved universally popular; the people are jealous of their boundaries and, apparently, willing to maintain them. They have usually built permanent stone beacons, to replace temporary timber structures, where the boundaries are not clearly defined by natural features.

This general method of controlled settlement was not individually applied or always possible. The great escarpment area of the Eastern Province,

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The great escarpment area of the Eastern Province, much of it inaccessible and uninhabitable, except for small pockets of fertile soil, was opened to unrestricted settlement by the Ambo and Senga-Kunda peoples. Other areas of poor soils and low carrying capacities in Fort Jameson District were also opened to free settlement up to a population total determined by the carrying capacity.

In Ndola District an area was opened to immediate uncontrolled settlement, in order to relieve acute land shortage and actual starvation in one section of the Reserve.

A somewhat modified method has been used in parts of Petauke District where dams are the only means of providing water. Here the population unit consists of three or four villages grouped into a 'parish' and settled about the watering points. A single land area is demarcated for each of these groups, instead of allocating a separate block to each village. This method allows of economy in the distribution of watering points, tends to reduce the effect of inter-village movements and, it is hoped, will lead to larger administrative units.

§ 7. *Agricultural Control and Improvement*

The general object of resettlement is to re-establish a population-land balance on the basis of traditional land usage *and the present population numbers*. Obviously, this balance cannot be permanent if the population is increasing; and if it is not increasing something is seriously wrong. Reliable vital statistics are entirely lacking but probably most of the tribes are increasing (the Ngoni may be an exception) at a rate which, judging by the very few available data, may be about 1½ per cent per annum, a rate which would double the population in forty-six years.

Resettlement is not, and was never regarded as, a substitute for agricultural improvement. The objects are to reduce the agricultural problem to practicable proportions, to relieve acute land shortage, to give time for experiment and the introduction of new methods. The assumption is that an evolutionary process of agricultural improvement will keep pace with natural increase of population, and that this process must be guided by experiment.

Simple measures of agricultural control, and the beginnings of soil conservation and agricultural improvement, have been introduced in each of the resettlement areas as a condition of occupation. It need hardly be said that these are not popular with the majority and the existence of such conditions is a deterrent to movement.

In the case of the earlier settlements in the Fort Jameson District an elementary system of soil conservation was introduced by demarcating the land for cultivation in contour strips separated by untouched belts of grass (which acquired the name of 'ten-yardis' since the original strips were ten paces wide). This was followed by an attempt to replace the traditional mound system of Ngoni, Chewa and Senga by cultivation on ridges

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approximately on the contour and parallel to demarcated 'marker' ridges on the true contour. A system of contour cultivation has now been developed which is proving practical and effective. The 'marker' ridges are demarcated at a vertical interval of two feet six inches and are gradually converted by the people into more or less broad-based banks. In the first year the ridge is built up to a base width of six feet and a height of not less than six inches. The base and height are increased until a permanent bank eight feet wide at the base and eighteen inches in height is completed. Villages on the 'ten yardi' system can change over to contour cultivation if the majority of people elect to do so. New villages are allowed to move into resettlement areas in the Eastern Province only on condition that they agree to practice contour cultivation; they are given four or five years to adapt themselves to the new system but in many cases practically the whole of the new gardens are under ridges by the end of the second year. Cultivation practice has been adapted to the new system and, meanwhile, experiments are being made to find the best methods of ridging, spacing and planting of crops for use in conjunctions with the ridge cultivation system.

In the Ndola District gardens are laid off between contour grass strips at vertical intervals of two feet. The people are then encouraged to convert the grass strip into three parallel ridges approximating to the normal dimension of their mounds for subsidiary crops and to plant the ridges with beans and cowpeas; or to make one or two such ridges and plant the remainder of the strip with groundnuts on the flat—a combination of contour ridges and strip cropping. This method, an adaptation of normal Lamba practice was adopted after a series of trials to find the simplest method of erosion control acceptable to these somewhat backward people. The object is not only to check erosion but to restore the cultivation of subsidiary crops, now almost entirely neglected. The planting of the ridges to beans and cowpeas and the strips to groundnuts restores the balance between cereals and legumes and should allow of a small surplus for sale. The idea seems to be less unpopular than one might expect and most villages have made a satisfactory effort to convert the strips into ridges for the cultivation of subsidiary crops.

Contours are laid off by trained African Assistants of the Department of Agriculture, using road tracers, and it has been found necessary during the initial stages of settlement to have one or two African Assistants* for at least every ten villages or, approximately, for every 600 to 1,000 people. Constant supervision is maintained during the initial phase by the African Agricultural Assistants in co-operation with District Messengers and the Native Authorities. This supervision is irksome and resented by some of the older people but it is, perhaps, significant that at a recent meeting of the African Regional Council of the Western Province after the subject had been freely debated, the council voted by a large majority for an increase in the number of Agricultural Capitaos.

Fruit tree planting has also been introduced and in the Eastern and Western Provinces laws made by the Native Authorities require each household

* Usually one and a learner assistant at Ndola.

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to plant a small number of trees (four per hut is the general rule). Seeds, seedlings and cuttings of mango, mulberry, lemon, guava, pawpaw and banana are distributed free from Departmental and Native Authority nurseries. The trees are planted within or about the sites of the new villages and the people are on the whole willing enough to plant them but show little inclination to care for them once they have been planted. Losses from drought and damage from fowls and small stocks are fairly heavy and in the Western Province two severe winters in succession have frosted off a number of young plantations. It is still uncertain whether this attempt to establish village orchards will be successful.

The only other general restrictions on land use are the prohibition of cultivation within demarcated areas and of late burning of grass and bush. In all village blocks non-cultivation areas have been demarcated for the preservation of streamsides and steep slopes. Areas have also been demarcated as Forest Reserves for future timber supplies and for the protection of watersheds, and in some cases land which is not required for present use has been reserved against the future needs of a growing population. Late burning of grass and bush is prohibited and the responsibility for early burning of the village blocks is placed upon the headman concerned. These prohibitions are enforced by Native Authority Rules.

§ 8. *Housing*

In most of the resettlement areas an attempt has been made to improve the standard of housing and the layout of villages and on the whole this has been fairly successful. When the permanent site has been selected (sometimes a lengthy business involving consultation with the ancestral spirits) the lay-out of the village is planned and the situation of each building marked out by an African Assistant. The people are persuaded to adopt a somewhat higher standard of building, but no compulsion is used and they have generally been willing enough to do so if the standard expected is not too high. The standard of housing and village lay-out is certainly an improvement, if not a very great one, on the standard within the Reserves.

In the Western Province a number of model villages have been built of Kimberley brick. These were built by the villagers themselves, with the assistance of a small team of skilled builders and thatchers employed by the Administration. The object was to stimulate a desire for better housing and it seems to have done so in some degree since most of the other villages have now volunteered to become 'models'.

§ 9. *Assisted Movements*

The movement of a village for a comparatively short distance, a day's journey of fifteen miles or so does not present any particular difficulty and the African has long been used to such movements. If it is impossible

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to clear large enough gardens at the new site in the first year a part of the old gardens can be used, for it is easy to travel back and forward between the old and new villages. The majority of the moves were of this order and no assistance was required or given. In the case of longer moves, heavy household goods and food stocks were transported by motor lorry, or in some instances when it was convenient to do so the entire grain stock was bought at the old village and food, purchased locally, was sold at the new site. This enabled the people to give the whole of their time to preparing a large garden acreage in the first year. The great majority of villages moving for moderate or long distances (twenty five to seventy miles) succeeded in preparing large enough gardens and growing sufficient food for themselves in the first year. A few did not, for one reason or another, such as starting too late, a bad season or just plain laziness, and these villages were supplied with food in the first season either in return for work or on promise of repayment after a good harvest. Less than 5 per cent of villages received such relief.

§ 10. *The Progress of Resettlement*

It was estimated that, in order to restore a complete population-land balance, about 141,300 people would have to be moved from the Reserves of the Fort Jameson and Petauke Districts. No such movement was, in fact, possible. The total carrying capacity of the land available for resettlement which contained a vast mass of escarpment hills and other large areas of almost useless land, was estimated to be 78,000 people. This land was, of necessity, allocated to the tribal groups in the following way:

Ngoni and Chewa	:	Sufficient land	for	35,000	people
Senga	:	"	"	"	35,000	"
Ambo	:	"	"	"	8,000	"

Thus in the case of the Ngoni and Chewa the available land was totally insufficient to allow of the restoration of a population-land balance, while in the case of the other peoples such a balance could be achieved.

Two alternatives were possible; to re-distribute the Ngoni and Chewa populations more or less evenly over the new land and the Reserves, in which case both would be over-populated in relation to their carrying capacities, or to populate the new land to the maximum of its carrying capacity, leaving the Reserves still over-populated. The latter course was adopted for a variety of reasons, including the fact that much of the new land was tsetse infested and the keeping of cattle and development of mixed farming would not be possible at least for a very considerable time. The Reserves, on the other hand, carried many cattle and, with reduction of the population by resettlement, would be able to support their populations on a basis of mixed farming.

Movement was therefore designed to populate the new areas to the maximum of their carrying capacity and to reduce the agricultural problem

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of the Reserves to manageable proportions, leaving an excess of population, but not too great an excess, within the cattle areas.

In Petauke District, where there is ample land available, the object aimed at is a complete restoration of the population-land balance by controlled movement of some 35,000 Senga and uncontrolled movement of 8,000 Ambo and Senga-Kunda.

Survey work in the Eastern Province started in 1941 and a few pioneer villages were moved in that year, but the main movement started in 1942 (when over 18,000 people were moved) and it is still in progress. By the end of 1945 the programme was more than half completed; 292 villages (about 32,000 people) had been moved into controlled 'village blocks' or 'parish settlements' in addition to uncontrolled or partially controlled movements in the escarpment area and parts of the Fort Jameson District. The comparatively slow rate of progress is due to water-shortage. Large areas in Petauke District and the north of Fort Jameson have not yet been settled for this reason, while in the latter area there is also some danger of sleeping sickness, and measures for the control of 'fly' (game destruction and clearing of 'hard pan') are in progress. Settlement is continuing at the rate set by provision of water supplies and the control of tsetse.

The Mkushi District presents an entirely different picture since the available land is about twice as much as the present population require, on the basis of their traditional agricultural practice. Here, instead of village blocks, comparatively large areas have been demarcated to take a number of villages and there is no strict control. The Superior Native Authority has introduced rules intended to bring about a gradual conversion from small circle *chitemene* (a primitive form of axe-agriculture) to hoe cultivation of kaffir corn with subsidiary gardens for a variety of crops.

The land not actually required for immediate use has not been allocated but is being held in reserve against the future needs of the African people and the Native Authorities undertake responsibility for early burning within the reserved land.

The bulk of the necessary population transfers have already been carried out.

In Ndola District also the available land is considerably greater than present needs and some is being held in reserve. Populations moved from the congested zone about the mines have been settled in village blocks and, apart from an area demarcated for immediate settlement in 1943 to relieve actual starvation, there is no uncontrolled settlement.

Movement of 120 villages, having a total estimated population of 11,775, was completed in 1945. It has since been found, however, that the population counts made by a District Officer seconded for the purpose are in fact over-estimated and a considerable number of the blocks are under-populated and further movements may be necessary.

/ For information concerning the relation between population patterns and land utilization, and particularly with regard to the resettlement program carried out by the Colonial Administration, see 5: Allan, FR5 Ngoni, category 116. Only specific data have been marked for this file, whereas there is much relevant information in the generalized sections of that source. The researcher particularly interested in the Lamba, however, is advised to consult the original account since the parts not processed for the files deal primarily with the Lamba tribal groups. --Analyst/